

SQUARE BOTTOMED PLASTIC BAG STACK AND METHOD OF MAKING SAME

Field of Invention

The invention pertains to plastic bags and methods of manufacturing them. More particularly, the invention relates to square bottomed bag stacks supplied with a detachable
5 header portion for suspending the bag stack as well as t-shirt style handle bags.

Background of the Invention

Plastic bags have replaced paper bags for many applications in recent years based upon the ease and economics with which they can be manufactured. However, at present, paper
10 bags are still favored for certain applications. Paper bags can easily be constructed with a completely flat bottom and can be made to stand up without a supporting rack both when empty and when filled. Also, paper bags tend to be somewhat porous and "breathable" and thus more desirable for use with items such as hot food products. For these reasons, paper bags have dominated such industries as fast food delivery and other applications in which it is
15 important to be able to easily position articles within the bag. Paper bags, on the other hand, have other problems. For example, strong handles are not easily attached to paper bags, the bags become weakened with moisture, they are heavy, bulky and require wood as raw material. Plastic bags, on the other hand, are more durable, more compact and light weight, stronger, impervious to moisture and can easily be made with strong handles:

20 Various designs have been developed in attempts to provide a practical, breathable, square bottomed plastic bag that will stand up when opened for filling and remain upright when filled. U.S. Patent No. 6,286,681 issued to *Wilfong, Jr. et al.* is directed to a ventilated

plastic bag embodying closely spaced micro-perforations that extend through the wall sections to provide ventilation to the interior food carrying area. These perforations allow the bag to be used for carrying hot food items without weakening the strength regions of the bag. The closed bottom area of the bag may be formed by heat-sealing of the film material, but may
5 also include corner or angle seals to define a square bottom on the bag.

U.S. Application Publication No. 2002/0110290 by *Gebhardt* discloses a plastic bag with randomly placed arcuate vent pairs. The bags described in this publication are made from a plastic tubing or sheeting stock. The bag may also include a handle aperture and the bag may include square-bottomed seals on gusseted bags. In the preferred embodiment of the receptacle
10 described, vents are cut into the material of the receptacle that can accommodate, store, and transport fresh hot foods to provide a breathable element desired for the bags.

U.S. Patent No. 6,319,184 issued to *DeMatteis* is directed to an apparatus and process for producing cold seal in plastic bags. The bags described may be of a semi-flat-bottom type and may have hand holes to form handles in the upper portion of the bags. U.S. Patent No.
15 6,113,269 issued to *DeMatteis* discloses an automatic ventilating system for plastic bags. U.S. Patent No. 6,095,687 issued to *DeMatteis* is directed to a flat bottomed plastic bag having a handle aperture. The bag described sits upright upon a bottom gusset.

U.S. Patent No. 5,149,201 issued to *Benoit* discloses a bag structure of a thermoplastic film material comprising front and rear bag walls connected by side walls and having an open
20 mouth top portion, said open mouth portion being characterized by having handles located at opposite end regions thereof, said handles being of two films as a result of being integral extensions of said front rear and gusseted side walls, said bag having a bottom wall planarly extensible so as to form a rectangle with at least no substantial excess film outside of the bulk

volumetric capacity of said bottom region of said bag. This invention also provides a method and system for preparing flat bottom thermoplastic sacks comprising process steps and means for forming a tube of thermoplastic film, collapsing said tube while forming two oppositely disposed gussets therein, forming two pairs of diagonal sealed seams in the gussets, forming a
5 transverse sealed seam across the tube along a line which includes the inboard ends of the diagonal seams and forming pre-weakened transverse lines closely adjacent to said transverse sealed seam or forming a severing line along this line, removing the four double triangular regions bounded by the diagonal seams, the transverse seams and the side edges of the tube and collecting the resulting structures either while still interconnected or by stacking the
10 severed sacks. The final structure can have handles or it can be handleless.

U.S. Patent No. 5,165,799 issued to *Wood* describes flexible square bottom bags which include side gusset panels having central inwardly oriented fin seams and which are sealed adjacent their lowermost corners to portions of the front and rear panels of the bags and wherein the entire width of the lowermost edges of the front and rear panels are sealed to
15 thereby form bags having bottoms reinforced by triangular gusset seals at each corner and which have an outwardly oriented transverse bottom fin seam when erected.

U.S. Patent No. 5,362,152 issued to *Fletcher et al.* describes a T-shirt type plastic bag adapted for carrying hot foods from fast food restaurants. The bag includes front and rear wall sections, gussetted side wall sections integrally connecting the front and rear wall sections
20 together and means connecting the bottoms of the front, rear and gussetted side wall sections together to define a closed bottom. At least a part of the front and rear wall sections are open at the tops to define a mouth portion. Laterally spaced handles are integral with the front, rear and gussetted side wall sections and extend upwardly from opposed sides of the mouth

portion. Apertures extend through at least one of the wall sections for providing a path for a venting air flow from the outside of the bag and through the inside of the bag when the bag is carrying hot food.

U.S. Patent No. 5,102,384 issued to *Ross et al.* discloses a method of constructing a flat
5 bottom in a plastic film tube having an open upper end, a closed lower end formed by a transverse seal, forward and rearward sides and a pair of opposing pleated sides that interconnect the forward and rearward sides. The method includes the steps of releasably engaging a lower vacuum and a lower clamp with a transverse section of the rearward side of the tube to provisionally hold the transverse section. A lateral section of the forward side is
10 gripped and raised by an upper vacuum and an upper clamp to expose a portion of the pleated sides such that first and second pockets are formed, respectively, in the sides. The sealed lower end is drawn toward the upper end to fold the tube along first and second transverse fold lines in the forward side, along a third transverse fold line in the transverse section of the rearward side, and along fourth and fifth fold lines, respectively, in the pleated sides such that
15 the first and second pockets are located in the pleated sides, respectively between the first and third fold lines and the lower end of the bag. Pressure is applied to the tube to form creases along the first, third, fourth and fifth fold lines, which define the perimeter of the flat bottom of the tube.

U.S. Patent No. 5,549,538 issued to *Marsik* describes a process for manufacturing a
20 multi-ply square bottom bag having a front wall, a back wall, a pair of gusseted side walls, each of which join to said front and back walls. There is also formed a gusseted square bottom panel having spaced but substantially parallel gusset edges and said bottom is joined to the front, back and side walls. The bag is produced by providing a web of inner ply material and a

web of outer ply material, adhesively joining said webs into a composite and forming said bag from said joined webs. The improvement relates to forming a first flap in the inner web by cutting the web so as to form a plurality of free edges and a hinge line for said flap. The hinge line is connected to the free edges so that the free edges and hinge line define the flap.

5 Thereafter joining the inner and outer webs to form the composite web. The hinge line is generally transverse to the longitudinal axis of the web and the flap is formed in the inner web so as to be positioned adjacent the front wall and bottom wall with the hinge line at the junction thereof when said bag is formed and said flap is arranged to overlie the gusset edges in the bottom panel.

10 It is an objective of the present invention to provide a registered bag stack with attached headers for suspension from a dispensing rack. It is an additional objective to provide a registered bag stack with integral t-shirt style handles formed in an upper portion of the bag. It is a further objective to provide square bottomed bags that will remain upright when opened in filled or unfilled condition. It is a still further objective of the invention to
15 provide a breathable or ventilated bag suitable for use with hot food or similar items. It is yet a further objective to provide a bag stack that has the above-described features that is easily and inexpensively manufactured.

While some of the objectives of the present invention are disclosed in the prior art, none of the inventions found include all of the requirements identified.

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Summary of the Invention

The present invention addresses all of the deficiencies of prior art square bottom bag stack inventions and satisfies all of the objectives described above.

(1) A square bottomed plastic bag stack providing the desired features may be constructed from the following components. A plurality of stacked polyethylene film bags is provided. Each of the bags includes front and rear polyethylene film walls. Each of the front and rear walls have first and second side edges, a top edge and a bottom edge. Each of the bags has a pair of longitudinally oriented side gussets attached to the first and second side edges. Each of the bags has a flat, rectangular bottom formed of lower portions of the front and rear walls and lower portions of the side gussets. Each of the bags is folded inwardly at the side gussets and upwardly from either the front wall or the rear wall at a point spaced upwardly from the bottom edge, to form a flattened bag. The bags are stacked upon one another and held in registration by attachment of the bags to one another, thereby forming a registered bag stack. Each of the bags is attached at the top edges of at least one of the front and rear walls to at least one header strip. When the bags are pulled from the bag stack and opened, they will stand erect upon the flat bottom.

(2) In a variant of the invention, a plurality of stacked polyethylene film bags is provided. Each of the bags includes front and rear polyethylene film walls. Each of the front and rear walls has first and second side edges, a top edge and a bottom edge. Each of the bags has a pair of longitudinally oriented side gussets attached to the first and second side edges. Each of the bags has a flat, rectangular bottom formed of lower portions of the front and rear walls and lower portions of the side gussets. Lower corners of the each side gusset are folded outwardly and together to form downward pointing triangular panels. The triangular panels are folded inwardly from the side gussets. Lower portions of the front and rear walls are folded inwardly and sealed together to form the bag bottom. The bag bottom is sealed to the side gussets adjacent upper edges of the triangular panels. The triangular panels are sealed to

an upper surface of the bag bottom. Each of the bags is folded inwardly at the side gussets and upwardly from either the front wall or the rear wall at a point spaced upwardly from the bottom edge, to form a flattened bag. The bags are stacked upon one another and held in registration by attachment of the bags to one another, thereby forming a registered bag stack.

- 5 When the bags are pulled from the bag stack and opened, they will stand erect upon the flat bottom.

(3) In a further variant, a plurality of stacked polyethylene film bags is provided. Each of the bags includes front and rear polyethylene film walls. Each of the front and rear walls has first and second side edges, a top edge and a bottom edge. Each of the bags has a pair of
10 longitudinally oriented side gussets attached to the first and second side edges. Each of the bags has a crease line. The crease line is parallel to the bottom edges and spaced upwardly from the bottom edges by approximately one half of a width of one of the side gussets. Each of the bags is slit from the bottom edges of the walls to the crease line at each intersection of the front and rear walls and the side gussets.

- 15 Each of the bags has a flat, rectangular bottom formed of lower portions of the front and rear walls and lower portions of the side gussets. Lower corners of the each side gusset are folded outwardly to the crease line and together to form downward pointing triangular panels. The triangular panels are folded inwardly from the side gussets at the crease line. Lower portions of the front and rear walls are folded inwardly from the crease line and sealed
20 together to form the bag bottom. The bag bottom is sealed to the side gussets adjacent the crease line and upper edges of the triangular panels. The triangular panels is sealed to an upper surface of the bag bottom. Each of the bags is folded inwardly at the side gussets and upwardly from either of the front wall and the rear wall at the crease line, to form a flattened

bag. The bags are stacked upon one another and held in registration by attachment of the bags to one another, thereby forming a registered bag stack. When the bags are pulled from the bag stack and opened, they will stand erect upon the flat bottom.

(4) In still a further variant, each of the bags is attached at the top edges of at least one
5 of the front and rear walls to at least one header strip.

(5) (6) In yet a further variant of the invention, the header strip is attached at the top edges of at least one of the front and rear walls by at least one perforation.

(7) (8) In still another variant, the header strip has at least one hole for suspending the bags from a dispensing rack.

10 (9) (10) In yet another variant, the header strip includes at least one weakened area. The weakened area extends from the hole to an upper edge of the header strip.

(11) In a further variant of the invention, the square bottomed plastic bag stack includes means for attaching an upper portion of the rear wall of a leading one of the bags to an upper portion of the front wall of a subsequent bag in the bag stack. When the leading bag
15 is pulled from the bag stack, the subsequent bag will cause the leading bag to open.

(12) In still a further variant, the means for attaching an upper portion of the rear wall of a leading one of the bags to an upper portion of the front wall of a subsequent bag in the bag stack is selected from the group that includes glue spotting, corona treatment, pressure and corona treatment with pressure.

20 (13) (14) In another variant, the header strips are attached to one another with at least one hot pin extending through the headers to maintain the bags in registration.

(15) (16) In still another variant of the invention, the header strips are attached to one another with at least one cold stake extending through the headers to maintain the bags in registration.

(17) (18) In yet another variant, at least one handle opening is provided. The handle opening extends through the front and rear walls in an upper portion of each of the bags.

(19) In a further variant, the bags are formed of a porous material.

(20) In still a further variant, the bags are formed of material having microperforations penetrating at least a portion of any of the bag walls and side gussets.

(21) In another variant, the bags have a plurality of ventilating openings penetrating at least a portion of any of the bag walls and side gussets.

(22) In still another variant, an upper seal is provided. The upper seal joins the front wall to the rear wall at the top edges of the bag walls and joins top edges of the side gussets. A U-shaped cutout is provided. The cutout commences at a first point on the upper seal. The first point is spaced from the first side edge and extends downwardly toward the bottom edges, across an upper portion of the bag walls and upwardly to a second point on the upper seal. The second point is spaced from the second side edge, thereby forming an open bag mouth and a pair of bag handles terminating at the upper seal.

(23) In yet another variant, the bags are attached to one another with at least one hot pin extending through the bag handles to maintain the bags in registration.

(24) In yet a further variant, the bags are attached to one another with at least one hot pin extending through the upper portion of the bag walls to maintain the bags in registration.

(25) In still a further variant, the bags are attached to one another with at least one cold stake extending through the bag handles to maintain the bags in registration.

(26) In another variant of the invention, the bags are attached to one another with at least one cold stake extending through the upper portion of the bag walls to maintain the bags in registration.

5 (27) In yet another variant, the bags further comprise a pair of apertures, each of the apertures penetrating the bag handles at a point spaced downwardly from the upper seal, the apertures permitting the bag stack to be suspended from a dispensing rack.

(28) In still another variant, a central tab is provided. The central tab extends upwardly from at least one of the front wall and the rear wall at the open mouth. The central tab has an opening through it for suspending the bag stack.

10 (29) In a further variant, the central tab is attached to at least one of the front wall and the rear wall at the open mouth at a weakened area. The weakened area permits the central tab to be torn from the open mouth of the bag as the bag is removed from a dispensing rack.

(30) In still a further variant, the central tab includes a weakened area. The weakened area extends from the opening to an upper edge of the central tab. The weakened area parts
15 under pressure as the bag is removed from a dispensing rack.

(31) In yet a further variant of the invention, at least one header strip is provided. The header strip is attached above the upper seal.

(32) In still another variant, the header strip is attached above the upper seal with at least one perforation.

20 (33) In still a further variant, the header strip has at least one hole therethrough for suspending the bag stack.

(34) In a further variant, the header strip includes a weakened area. The weakened area extending from the hole to an upper edge of the header strip. The weakened area parting as the bag is removed from a dispensing rack.

(35) A method of making a square bottomed plastic bag stack, includes the following
5 steps. Extruding a tube of polyethylene material. Forming side gussets in the tube and flattening the tube. Cutting the flattened tube perpendicular to the side gussets to a first predetermined length, thereby forming a bag blank. The bag blank has front and rear walls, front and rear top edges, front and rear bottom edges, first and second side edges. Slitting the bag blank at intersections of the side gussets and the front and rear walls from the front and
10 rear bottom edges upwardly for a first predetermined distance. Folding lower corners of the each side gusset outwardly and together to form downward pointing triangular panels. Folding the triangular panels inwardly from the side gussets. Folding lower portions of the front and rear walls inwardly. Sealing the front and rear wall together adjacent the front and rear bottom edges to form a bag bottom. Sealing the bag bottom to the side gussets adjacent
15 upper edges of the triangular panels. Sealing the triangular panels to an upper surface of the bag bottom.

Folding each of the bags inwardly at the side gussets and upwardly from either of the front wall and the rear wall at a point spaced upwardly from the bottom edge, to form a flattened bag. Stacking a plurality of the bag blanks in registration to form a bag stack.

20 (36) A variant of the method of making a square bottomed plastic bag stack, includes the following steps. Extruding a tube of polyethylene material. Forming side gussets in the tube and flattening the tube. Cutting the flattened tube perpendicular to the side gussets to a first predetermined length, thereby forming a bag blank. The bag blank has front and rear

walls, front and rear top edges, front and rear bottom edges, first and second side edges.

Forming a crease line in each of the bag blanks. The crease line is parallel to the bottom edges and spaced upwardly from the bottom edges by approximately one half of a width of one of the side gussets. Slitting each of the bag blanks from the bottom edges of the walls to

5 the crease line at each intersection of the front and rear walls and the side gussets. Folding lower corners of the each side gusset outwardly to the crease line and together to form downward pointing triangular panels. Folding the triangular panels inwardly from the side gussets at the crease line. Folding lower portions of the front and rear walls inwardly from the crease line. Sealing the front and rear wall together adjacent the front and rear bottom edges
10 to form a bag bottom. Sealing the bag bottom to the side gussets adjacent the crease line and upper edges of the triangular panels. Sealing the triangular panels to an upper surface of the bag bottom. Folding each of the bag blanks inwardly at the side gussets and upwardly from either of the front wall and the rear wall at the crease line, to form a flattened bag. Stacking a plurality of the bag blanks in registration to form a bag stack.

15 (37) A further variant of the method of making a square bottomed plastic bag stack includes the following steps. Prior to stacking the bag blanks, perforating the bag blank at a perforation line, the perforation line located at a second predetermined distance from the front and rear top edges. Cutting the bag stack above the perforation line to form a plurality of bag stack header strips. Attaching the header strips to one another to maintain the bags in
20 registration. When the bags are pulled from the bag stack and opened, they will stand erect upon the flat bottom.

(38) A still further variant of the method of making a square bottomed plastic bag stack includes the following step of cutting at least one hole in the header strips for suspending the bags from a dispensing rack.

(39) Yet a further variant of the method of making a square bottomed plastic bag stack includes the step of forming at least one weakened area. The weakened area extends from the hole to an upper edge of the header strip.

(40) Still a further variant of the method of making a square bottomed plastic bag stack includes the step of attaching an upper portion of the rear wall of a leading one of the bags to an upper portion of the front wall of a subsequent bag in the bag stack. When the leading bag is pulled from the bag stack, the subsequent bag will cause the leading bag to open.

(41) Another variant of the method of making a square bottomed plastic bag stack includes the step of providing a means for attaching an upper portion of the rear wall of a leading one of the bags to an upper portion of the front wall of a subsequent bag in the bag stack. The means are selected from the following group that includes glue spotting, corona treatment, pressure and corona treatment with pressure.

(42) Still another variant of the method of making a square bottomed plastic bag stack includes the step of driving at least one hot pin through the headers to maintain the bags in registration.

(43) Yet another variant of the method of making a square bottomed plastic bag stack includes the step of driving at least one cold stake through the headers to maintain the bags in registration.

(44) A further variant of the method of making a square bottomed plastic bag stack includes the step of cutting at least one handle opening in the bag stack. The handle opening extends through the front and rear walls in an upper portion of each of the bags.

(45) Still a further variant of the method of making a square bottomed plastic bag stack
5 includes the step of forming the bags of a porous material.

(46) Yet a further variant of the method of making a square bottomed plastic bag stack includes the step of forming microperforations penetrating at least a portion of any of the bag walls and side gussets.

(47) Still a further variant of the method of making a square bottomed plastic bag stack
10 includes the step of forming a plurality of ventilating opening penetrating at least a portion of any of the bag walls and side gussets.

(48) Another variant of the method of making a square bottomed plastic bag stack includes the following steps. Prior to stacking the bag blanks, joining the front wall to the rear wall at the top edges of the bag walls and joining top edges of the side gussets, thereby
15 forming an upper seal. Forming a U-shaped cutout. The cutout commences at a first point on the upper seal spaced from the first side edge and extends downwardly toward the bottom edges, across an upper portion of the bag walls and upward to a second point on the upper seal spaced from the second side edge, thereby forming an open bag mouth and a pair of bag handles terminating at the upper seal.

20 (49) Still another variant of the method of making a square bottomed plastic bag stack includes the step of driving at least one hot pin through the upper portion of the bag walls to maintain the bags in registration.

(50) A further variant of the method of making a square bottomed plastic bag stack includes the step of driving at least one hot pin through the bag handles to maintain the bags in registration.

5 (51) Yet a further variant of the method of making a square bottomed plastic bag stack includes the step of driving at least one cold stake through the upper portion of the bag walls to maintain the bags in registration.

(52) Still a further variant of the method of making a square bottomed plastic bag stack includes the step of driving at least one cold stake through the bag handles to maintain the bags in registration.

10 (53) Another variant of the method of making a square bottomed plastic bag stack includes the step of cutting a pair of apertures. Each of the apertures penetrate the bag handles at a point spaced downwardly from the upper seal. The apertures permit the bag stack to be suspended from a dispensing rack.

(54) Still another variant of the method of making a square bottomed plastic bag stack
15 includes the step of forming a central tab. The central tab extends upwardly from at least one of the front wall and the rear wall at the open mouth. The central tab has an opening through it for suspending the bag stack.

(55) Yet another variant of the method of making a square bottomed plastic bag stack includes the step of forming a weakened area. The weakened area attaches the central tab to
20 at least one of the front wall and the rear wall at the open mouth. The weakened area permits the central tab to be torn from the open mouth of the bag as the bag is removed from a dispensing rack.

(56) A further variant of the method of making a square bottomed plastic bag stack includes the step of forming the central tab with a weakened area. The weakened area extends from the opening to an upper edge of the central tab. The weakened area parts under pressure as the bag is removed from a dispensing rack.

5 (57) Still a further variant of the method of making a square bottomed plastic bag stack includes the step of attaching a header strip above the upper seal.

(58) Yet a further variant of the method of making a square bottomed plastic bag stack includes the step of attaching the header strip above the upper seal with at least one perforation.

10 (59) Another variant of the method of making a square bottomed plastic bag stack includes the step of cutting at least one hole through the header strip for suspending the bag stack.

(60) A final variant of the method of making a square bottomed plastic bag stack includes the step of forming a weakened area. The weakened area extends from the opening
15 to an upper edge of the header strip. The weakened area parts as the bag is removed from a dispensing rack.

An appreciation of the other aims and objectives of the present invention and an understanding of it may be achieved by referring to the accompanying drawings and the detailed description of a preferred embodiment.

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Description of the Drawings

Figure 1 is a perspective view of a gusseted open mouth bag with bottom seal;

Figure 2 is a perspective view of the **Figure 1** embodiment with the bag sides pulled outwardly to form bottom edges;

Figure 3 is a perspective view of the **Figure 1** embodiment illustrating a flattened bag bottom;

5 **Figure 4** is a perspective view of a second embodiment of bag formed from a section of gusseted tubing illustrating slitting of lower corners of the tube;

Figure 5 is a perspective view of the **Figure 4** embodiment illustrating the outward folding of lower ends of the side gussets to form triangular portions;

10 **Figure 6** is a perspective view of the **Figure 4** embodiment illustrating the inward folding of the triangular portions of the **Figure 5** embodiment;

Figure 7 is a perspective view of the **Figure 4** embodiment illustrating a bag bottom formed from lower portions of the front and rear bag walls secured to each other and the ends of the side gussets;

15 **Figure 8** is a perspective view of the **Figure 4** embodiment illustrating the folding of the bag bottom along side the bag walls;

Figure 9 is a perspective view of a stack of bags of the **Figure 4** embodiment;

Figure 10 is a front elevational view of a third embodiment illustrating a header attached at a perforation line;

20 **Figure 11** is a front elevational view of a fourth embodiment illustrating a header having weakened areas in the hanging openings;

Figure 12 is a front elevational view of a fifth embodiment illustrating a header attached at a perforation line, having a center tab and cold stakings or hot pinnings registering the bag pack;

Figure 13 is a perspective view of the **Figure 10** embodiment illustrating the bag pack on a dispensing rack and glue spots adhering the bags together;

Figure 14 is a perspective view of the **Figure 4** embodiment illustrating a bag with central handles;

5 **Figure 15** is a perspective view of the **Figure 4** embodiment illustrating a bag with microperforations in the front and rear bag walls and the gussets;

Figure 16 is a front elevational view of a t-shirt style square bottom bag with center tab;

10 **Figure 17** is a front elevational view of a second embodiment of a t-shirt style square bottom bag having a central glue spot;

Figure 18 is a front elevational view of a third embodiment of a t-shirt style square bottom bag having a center tab with a weakened area between the tab opening and the upper edge of the bag mouth;

15 **Figure 19** is a front elevational view of a fourth embodiment of a t-shirt style square bottom bag having a removable center tab joined to the bag with a frangible area;

Figure 20 is a front elevational view of a fifth embodiment of a t-shirt style square bottom bag having a removable header joined to the upper edges of the bag handles with a perforation line;

20 **Figure 21** is a front elevational view of a sixth embodiment of a t-shirt style square bottom bag having a header joined to the upper edges of the bag handles and having weakened areas in the bag support openings;

Figure 22 is a perspective view of an apparatus for forming the bags of the **Figure 4** embodiment including gusseting and slitting the extruded tubing;

Figure 23 is a perspective view of the method of folding the lower ends of the bag gussets outwardly to form triangular portions;

Figure 24 is a perspective view of the method of folding the triangular portions inwardly as part of the bag bottom;

5 **Figure 25** a perspective view of the method of folding the front and rear bag walls over the triangular portions and fastening them to each other, the triangular portions and the side gussets to form the bag bottom;

Figure 26 is a bottom side view of the assembled bag illustrating the bottom and side seams;

10 **Figure 27** is a perspective view of the method of forming the **Figure 11** embodiment of a headered bag with attaching glue spots;

Figure 28 is a perspective view of a method of adding vent holes to the bag walls as in the **Figure 15** embodiment;

15 **Figure 29** is a perspective view of a method of adding handleholes to the bag walls as in the **Figure 14** embodiment;

Figure 30 is a perspective view of a method of using a hot pin to the bag walls to one another as in the **Figure 12** embodiment;

Figure 31 is a perspective view of a method of forming a gusseted t-shirt style bag as in the **Figure 21** embodiment;

20 **Figure 32** is a perspective view of a method of forming a headered t-shirt style bag as in the **Figure 20** embodiment;

Figure 33 is a perspective view of a bag stack of square bottom t-shirt style bags being adhered together with a hot pin through an upper portion of the bags; and

Figure 34 is a perspective view of a bag stack of square bottom t-shirt style bags being adhered together with a hot pin through the handles of the bags.

Detailed Description of the Preferred Embodiment

- 5 (1) **Figure 9** illustrates a square bottomed plastic bag stack **10** providing the desired features that may be constructed from the following components. A plurality of stacked polyethylene film bags **15** is provided. As illustrated in **Figures 1-3**, each of the bags **15** includes front **20** and rear **25** polyethylene film walls. Each of the front **20** and rear **25** walls have first **30** and second **35** side edges, a top edge **40** and a bottom edge **45**. Each of the bags
- 10 **15** has a pair of longitudinally oriented side gussets **50** attached to the first **30** and second **35** side edges. Each of the bags **15** has a flat, rectangular bottom **55** formed of lower portions **60** of the front **20** and rear **25** walls and lower portions **65** of the side gussets **50**. As illustrated in **Figures 8 and 9**, each of the bags **15** is folded inwardly at the side gussets **50** and upwardly from either the front wall **20** or the rear wall **25** at a point **70** spaced upwardly from the bottom
- 15 edge **45**, to form a flattened bag **15**. The bags **15** are stacked upon one another and held in registration by attachment of the bags **15** to one another, thereby forming a registered bag stack **10**. As illustrated in **Figures 10-12**, each of the bags **15** is attached at the top edges **40** of at least one of the front **20** and rear **25** walls to at least one header strip **75**. When the bags **15** are pulled from the bag stack **10** and opened, they will stand erect upon the flat bottom **55**.
- 20 (2) In a variant of the invention, as illustrated in **Figures 4-7**, a plurality of stacked polyethylene film bags **15** is provided. Each of the bags **15** includes front **20** and rear **25** polyethylene film walls. Each of the front **20** and rear **25** walls has first **30** and second **35** side edges, a top edge **40** and a bottom edge **45**. Each of the bags **15** has a pair of longitudinally

oriented side gussets **50** attached to the first **30** and second **35** side edges. Each of the bags **15** has a flat, rectangular bottom **55** formed of lower portions **60** of the front **20** and rear **25** walls and lower portions **65** of the side gussets **50**. As illustrated in **Figure 5**, lower corners **80** of the each side gusset **50** are folded outwardly and together to form downward pointing

5 triangular panels **85**. As illustrated in **Figure 6**, the triangular panels **85** are folded inwardly from the side gussets **50**. Lower portions **60** of the front **20** and rear **25** walls are folded inwardly and sealed together to form the bag bottom **55**. As illustrated in **Figures 8 and 9**, the bag bottom **55** is sealed to the side gussets **50** adjacent upper edges **90** of the triangular panels **85**. The triangular panels **85** are sealed to an upper surface **95** of the bag bottom **55**. Each of

10 the bags **15** is folded inwardly at the side gussets **50** and upwardly from either the front wall **20** or the rear wall **25** at a point **70** spaced upwardly from the bottom edge **45**, to form a flattened bag **15**. The bags **15** are stacked upon one another and held in registration by attachment of the bags **15** to one another, thereby forming a registered bag stack **10**. When the bags **15** are pulled from the bag stack **10** and opened, they will stand erect upon the flat

15 bottom **55**.

(3) In a further variant, as illustrated in **Figures 4-7**, a plurality of stacked polyethylene film bags **15** is provided. Each of the bags **15** includes front **20** and rear **25** polyethylene film walls. Each of the front **20** and rear **25** walls has first **30** and second **35** side edges, a top edge **40** and a bottom edge **45**. Each of the bags **15** has a pair of longitudinally

20 oriented side gussets **50** attached to the first **30** and second **35** side edges. Each of the bags **15** has a crease line **100**. The crease line **100** is parallel to the bottom edges **45** and spaced upwardly from the bottom edges **45** by approximately one half of a width **105** of one of the

side gussets **50**. Each of the bags **15** is slit from the bottom edges **45** of the walls **20**, **25** to the crease line **100** at each intersection of the front **20** and rear **25** walls and the side gussets **50**.

Each of the bags **15** has a flat, rectangular bottom **55** formed of portions of the front **20** and rear **25** walls and portions of the side gussets **50**. Lower corners **80** of the each side gusset **50** are folded outwardly to the crease line **100** and together to form downward pointing triangular panels **85**. The triangular panels **85** are folded inwardly from the side gussets **50** at the crease line **100**. Lower portions **60** of the front **20** and rear **25** walls are folded inwardly from the crease line **100** and sealed together to form the bag bottom **55**. The bag bottom **55** is sealed to the side gussets **50** adjacent the crease line **100** and upper edges **90** of the triangular panels **85**. The triangular panels **85** are sealed to an upper surface **95** of the bag bottom **55**. Each of the bags **15** is folded inwardly at the side gussets **50** and upwardly from either of the front wall **20** and the rear wall **25** at the crease line **100**, to form a flattened bag **15**. The bags **15** are stacked upon one another and held in registration by attachment of the bags **15** to one another, thereby forming a registered bag stack **10**. When the bags **15** are pulled from the bag stack **10** and opened, they will stand erect upon the flat bottom **55**.

(4) In still a further variant, as illustrated in **Figures 10-12**, each of the bags **15** is attached at the top edges **40** of at least one of the front **20** and rear **25** walls to at least one header strip **75**.

(5) (6) In yet a further variant of the invention, as illustrated in **Figures 10 and 12**, the header strip **75** is attached at the top edges **40** of at least one of the front **20** and rear **25** walls by at least one perforation **115**.

(7) (8) In still another variant, as illustrated in **Figures 10-13**, the header strip **75** has at least one hole **120** for suspending the bags **15** from a dispensing rack **125**.

(9) (10) In yet another variant, as illustrated in **Figure 11**, the header strip **75** includes at least one weakened area **130**. The weakened area **130** extends from the hole **120** to an upper edge **135** of the header strip **75**.

(11) In a further variant of the invention, as illustrated in **Figure 13**, the square
5 bottomed plastic bag stack **10** includes means **140** for attaching an upper portion **145** of the rear wall **25** of a leading one of the bags **15** to an upper portion **145** of the front wall **20** of a subsequent bag **15** in the bag stack **10**. When the leading bag **15** is pulled from the bag stack **10**, the subsequent bag **15** will cause the leading bag **15** to open.

(12) In still a further variant, as illustrated in **Figure 27**, the means **140** for attaching
10 an upper portion **145** of the rear wall **25** of a leading one of the bags **15** to an upper portion **145** of the front wall **20** of a subsequent bag **15** in the bag stack **10** is selected from the group that includes glue spotting **150**, corona treatment **155**, pressure **160** and corona treatment with pressure.

(13) (14) In another variant, as illustrated in **Figure 12**, the header strips **75** are
15 attached to one another with at least one hot pin **165** extending through the headers **75** to maintain the bags **15** in registration.

(15) (16) In still another variant of the invention, as illustrated in **Figure 12**, the header strips **75** are attached to one another with at least one cold stake **170** extending through the headers **75** to maintain the bags **15** in registration.

20 (17) (18) In yet another variant, as illustrated in **Figure 14**, at least one handle opening **175** is provided. The handle opening **175** extends through the front **20** and rear **25** walls in an upper portion **145** of each of the bags **15**.

(19) In a further variant, the bags **15** are formed of a porous material (not shown).

(20) In still a further variant, as illustrated in **Figure 15**, the bags **15** are formed of material having microperforations **185** penetrating at least a portion **190** of any of the bag walls **20**, **25** and side gussets **50**.

(21) In another variant, as illustrated in **Figure 15**, the bags **15** have a plurality of ventilating openings **195** penetrating at least a portion **190** of any of the bag walls **20**, **25** and side gussets **50**.

(22) In still another variant, as illustrated in **Figure 16**, an upper seal **200** is provided. The upper seal **200** joins the front wall **20** to the rear wall **25** at the top edges **40** of the bag walls **20**, **25** and joins top edges **205** of the side gussets **50**. A U-shaped cutout **210** is provided. The cutout **205** commences at a first point **215** on the upper seal **200**. The first point **215** is spaced from the first side edge **30** and extends downwardly toward the bottom edges **45**, across an upper portion **145** of the bag walls **20**, **25** and upwardly to a second point **220** on the upper seal **200**. The second point **220** is spaced from the second side edge **35**, thereby forming an open bag mouth **225** and a pair of bag handles **230** terminating at the upper seal **200**.

(23) In yet another variant, as illustrated in **Figure 16**, the bags **15** are attached to one another with at least one hot pin **165** extending through the bag handles **230** to maintain the bags **15** in registration.

(24) In yet a further variant, as illustrated in **Figure 17**, the bags **15** are attached to one another with at least one hot pin **165** extending through the upper portion **145** of the bag walls **20**, **25** to maintain the bags **15** in registration.

(25) In still a further variant, as illustrated in **Figure 16**, the bags **15** are attached to one another with at least one cold stake **170** extending through the bag handles **230** to maintain the bags **15** in registration.

(26) In another variant of the invention, as illustrated in **Figure 17**, the bags **15** are
5 attached to one another with at least one cold stake **170** extending through the upper portion **145** of the bag walls **20, 25** to maintain the bags **15** in registration.

(27) In yet another variant, as illustrated in **Figure 17**, the bags **15** further comprise a pair of apertures **235**, each of the apertures **235** penetrating the bag handles **230** at a point **440** spaced downwardly from the upper seal **200**, the apertures **235** permitting the bag stack **10** to
10 be suspended from a dispensing rack **125**.

(28) In still another variant, as illustrated in **Figure 19**, a central tab **240** is provided. The central tab **240** extends upwardly from at least one of the front wall **20** and the rear wall **25** at the open mouth **225**. The central tab **240** has an opening **245** through it for suspending the bag stack **10**.

(29) In a further variant, as illustrated in **Figure 19**, the central tab **240** is attached to at
15 least one of the front wall **20** and the rear wall **25** at the open mouth **225** at a weakened area **250**. The weakened area **250** permits the central tab **240** to be torn from the open mouth **225** of the bag **15** as the bag **15** is removed from a dispensing rack **125**.

(30) In still a further variant, as illustrated in **Figure 18**, the central tab **240** includes a
20 weakened area **250**. The weakened area **250** extends from the opening **245** to an upper edge **255** of the central tab **240**. The weakened area **250** parts under pressure as the bag **15** is removed from a dispensing rack **125**.

(31) In yet a further variant of the invention, as illustrated in **Figures 20 and 21**, at least one header strip **75** is provided. The header strip **75** is attached above the upper seal **200**.

(32) In still another variant, as illustrated in **Figure 20**, the header strip **75** is attached above the upper seal **200** with at least one perforation **115**.

5 (33) In still a further variant, as illustrated in **Figures 20 and 21**, the header strip **75** has at least one hole **120** therethrough for suspending the bag stack **10**.

(34) In a further variant, as illustrated in **Figure 21**, the header strip **75** includes a weakened area **130**. The weakened area **130** extending from the hole **120** to an upper edge **135** of the header strip **75**. The weakened area **130** parting as the bag **115** is removed from a
10 dispensing rack **125**.

(35) In another variant, as illustrated in **Figures 22-26**, a method of making a square bottomed plastic bag stack **10**, includes the following steps. Extruding a tube of polyethylene material **260**. Forming side gussets **50** in the tube **260** and flattening the tube **260**. Cutting the flattened tube **260** perpendicular to the side gussets **50** to a first predetermined length **265**,
15 thereby forming a bag blank **270**. The bag blank **270** has front **20** and rear **25** walls, front and rear top edges **40**, front and rear bottom edges **45**, first **30** and second **35** side edges. Slitting the bag blank **270** at intersections **320** of the side gussets **50** and the front **20** and rear **25** walls from the front **45** and rear **45** bottom edges upwardly for a first predetermined distance **325**.
Folding lower corners **80** of the each side gusset **50** outwardly and together to form downward
20 pointing triangular panels **85**. Folding the triangular panels **85** inwardly from the side gussets **50**. Folding lower portions **60** of the front **20** and rear **25** walls inwardly, as illustrated in **Figure 8**. Sealing the front **20** and rear **25** wall together adjacent the front and rear bottom edges **45** to form a bag bottom **55**. Sealing the bag bottom **55** to the side gussets **50** adjacent

upper edges **90** of the triangular panels **85**. Sealing the triangular panels **85** to an upper surface **95** of the bag bottom **55**. Folding each of the bags **15** inwardly at the side gussets **50** and upwardly from either of the front wall **20** and the rear wall **25** at a point **70** spaced upwardly from the bottom edge, **45** to form a flattened bag **15**. Stacking a plurality of the
 5 bags **15** in registration to form a bag stack **10** as illustrated in **Figure 9**.

(36) In yet another variant of the method of making a square bottomed plastic bag stack **10**, includes the following steps, as illustrated in **Figures 22** and **26**. Extruding a tube of polyethylene material **260**. Forming side gussets **50** in the tube **260** and flattening the tube **260**. Cutting the flattened tube **260** perpendicular to the side gussets **50** to a first
 10 predetermined length **265**, thereby forming a bag blank **270**. The bag blank **270** has front **20** and rear **25** walls, front and rear top edges **40**, front and rear bottom edges **45**, first **30** and second **35** side edges. Forming a crease line **100** in each of the bag blanks **270**. The crease line **100** is parallel to the bottom edges **45** and spaced upwardly from the bottom edges **45** by approximately one half of a width **105** of one of the side gussets **50**. Slitting each of the bag
 15 blanks **270** from the bottom edges **45** of the walls **20**, **25** to the crease line **100** at each intersection **320** of the front **20** and rear **25** walls and the side gussets **50**. Folding lower corners of the each side gusset **50** outwardly to the crease line **100** and together to form downward pointing triangular panels **85**. Folding the triangular panels **85** inwardly from the side gussets **50** at the crease line **100**. Folding lower portions **60** of the front **20** and rear **25**
 20 walls inwardly from the crease line **100**. Sealing the front **20** and rear **25** wall together adjacent the front and rear bottom edges **45** to form a bag bottom **55**. Sealing the bag bottom **55** to the side gussets **50** adjacent the crease line **100** and upper edges **90** of the triangular panels **85**. Sealing the triangular panels **85** to an upper surface **95** of the bag bottom **55**.

Folding each of the bag blanks **270** inwardly at the side gussets **50** and upwardly from either of the front wall **20** and the rear wall **25** at the crease line **100**, to form a flattened bag **15**, as illustrated in **Figure 8**. Stacking a plurality of the bags **15** in registration to form a bag stack **10**, as illustrated in **Figure 9**.

5 (37) A further variant of the method of making a square bottomed plastic bag stack **10** includes the following steps, as illustrated in **Figure 27**. Prior to stacking the bag blanks **270**, perforating the bag blank **270** at a perforation line **365**, the perforation line **365** located at a second predetermined distance **370** from the front and rear top edges **40**. Cutting the bag stack **10** above the perforation line **365** to form a plurality of bag stack header strips **75**.

10 Attaching the header strips **75** to one another to maintain the bags **15** in registration, as illustrated in **Figures 30**. When the bags **15** are pulled from the bag stack **10** and opened, they will stand erect upon the flat bottom **55**.

 (38) A still further variant of the method of making a square bottomed plastic bag stack **10** includes the following step of cutting at least one hole **120** in the header strips **110**
15 for suspending the bags **15** from a dispensing rack **125**, as illustrated in **Figure 27**.

 (39) Yet a further variant of the method of making a square bottomed plastic bag stack **10** includes the step of forming at least one weakened area **130**. The weakened area **130** extends from the hole **120** to an upper edge **135** of the header strip **75**, as illustrated in **Figure 27**.

20 (40) Still a further variant of the method of making a square bottomed plastic bag stack **10** includes the step of attaching an upper portion **145** of the rear wall **25** of a leading one of the bags **15** to an upper portion **145** of the front wall **20** of a subsequent bag **15** in the bag

stack 10. When the leading bag 15 is pulled from the bag stack 10, the subsequent bag 15 will cause the leading bag 15 to open, as illustrated in **Figure 27**.

(41) Another variant of the method of making a square bottomed plastic bag stack 10 includes the step of providing a means for attaching an upper portion 145 of the rear wall 25 of a leading one of the bags 15 to an upper portion 145 of the front wall 20 of a subsequent bag 15 in the bag stack 10. The means are selected from the following group that includes glue spotting 140, corona treatment 155, pressure 160 and corona treatment with pressure, as illustrated in **Figure 27**.

(42) Still another variant of the method of making a square bottomed plastic bag stack 10 includes the step of driving at least one hot pin 165 through the headers 110 to maintain the bags 15 in registration, as illustrated in **Figure 30**.

(43) Yet another variant of the method of making a square bottomed plastic bag stack 10 includes the step of driving at least one cold stake 170 through the headers 110 to maintain the bags 15 in registration, as illustrated in **Figures 12 and 17**.

(44) A further variant of the method of making a square bottomed plastic bag stack 10 includes the step of cutting at least one handle opening 175 in the bag blank 270. The handle opening 175 extends through the front 20 and rear 25 walls in an upper portion 145 of each of the bags 15, as illustrated in **Figure 29**.

(45) Still a further variant of the method of making a square bottomed plastic bag stack 10 includes the step of forming the bags 15 of a porous material (not shown).

(46) Yet a further variant of the method of making a square bottomed plastic bag stack 10 includes the step of forming microperforations 185 penetrating at least a portion of any of the bag walls 20, 25 and side gussets 50, as illustrated in **Figure 15**.

(47) Still a further variant of the method of making a square bottomed plastic bag stack 10 includes the step of forming a plurality of ventilating openings 195 penetrating at least a portion of any of the bag walls 20, 25 and side gussets 50, as illustrated in **Figure 15**.

(48) Another variant of the method of making a square bottomed plastic bag stack 10 includes the following steps. Prior to stacking the bag blanks 270, joining the front wall 20 to the rear wall 25 at the top edges 40 of the bag walls 20, 25 and joining top edges 40 of the side gussets 50, thereby forming an upper seal 200. Forming a U-shaped cutout 210. The cutout 210 commences at a first point 215 on the upper seal 200 spaced from the first side edge 30 and extends downwardly toward the bottom edges 45, across an upper portion 145 of the bag walls 20, 25 and upward to a second point 220 on the upper seal 200 spaced from the second side edge 35, thereby forming an open bag mouth 225 and a pair of bag handles 230 terminating at the upper seal 200, as illustrated in **Figure 31**.

(49) Still another variant of the method of making a square bottomed plastic bag stack 10 includes the step of driving at least one hot pin 165 through the upper portion 145 of the bag walls 20, 25 to maintain the bags 15 in registration, as illustrated in **Figure 33**.

(50) A further variant of the method of making a square bottomed plastic bag stack 10 includes the step of driving at least one hot pin 165 through the bag handles 230 to maintain the bags 15 in registration, as illustrated in **Figure 34**.

(51) Yet a further variant of the method of making a square bottomed plastic bag stack 10 includes the step of driving at least one cold stake (not shown) through the upper portion of the bag walls 20, 25 to maintain the bags 15 in registration.

(52) Still a further variant of the method of making a square bottomed plastic bag stack 10 includes the step of driving at least one cold stake (not shown) through the bag handles 230 to maintain the bags 15 in registration.

(53) Another variant of the method of making a square bottomed plastic bag stack 10 includes the step of cutting a pair of apertures 235, as illustrated in **Figure 31**. Each of the apertures 235 penetrates the bag handles 230 at a point 440 spaced downwardly from the upper seal 200. The apertures permit the bag stack 10 to be suspended from a dispensing rack 125.

(54) Still another variant of the method of making a square bottomed plastic bag stack 10 includes the step of forming a central tab 240, as illustrated in **Figure 31**. The central tab 240 extends upwardly from at least one of the front wall 20 and the rear wall 25 at the open mouth 225. The central tab 240 has an opening 245 through it for suspending the bag stack 10.

(55) Yet another variant of the method of making a square bottomed plastic bag stack 10 includes the step of forming a weakened area 250, as illustrated in **Figure 31**. The weakened area 250 attaches the central tab 240 to at least one of the front wall 20 and the rear wall 25 at the open mouth 225. The weakened area 250 permits the central tab 240 to be torn from the open mouth 225 of the bag 15 as the bag 15 is removed from a dispensing rack 125.

(56) A further variant of the method of making a square bottomed plastic bag stack 10 includes the step of forming the central tab 240 with a weakened area 250, as illustrated in **Figure 18**. The weakened area 250 extends from the opening 245 to an upper edge 255 of the central tab 240. The weakened area 250 parts under pressure as the bag 15 is removed from a dispensing rack 125.

(57) Still a further variant of the method of making a square bottomed plastic bag stack 10 includes the step of attaching a header strip 75 above the upper seal 200, as illustrated in Figure 32.

5 (58) Yet a further variant of the method of making a square bottomed plastic bag stack 10 includes the step of attaching the header strip 75 above the upper seal 200 with at least one perforation 115, as illustrated in Figure 32.

(59) Another variant of the method of making a square bottomed plastic bag stack 10 includes the step of cutting at least one hole 120 through the header strip 75 for suspending the bag stack 10, as illustrated in Figure 32.

10 (60) A final variant of the method of making a square bottomed plastic bag stack 10 includes the step of forming a weakened area 130, as illustrated in Figure 11. The weakened area 130 extends from the opening 410 to an upper edge 135 of the header strip 110. The weakened area 130 parts as the bag 15 is removed from a dispensing rack 125.

15 An appreciation of the other aims and objectives of the present invention and an understanding of it may be achieved by referring to the accompanying drawings and the detailed description of a preferred embodiment.